Notes on the Grass Webworm, *Herpetogramma licarsisalis* (Walker) (Lepidoptera: Pyraustidae), A New Pest of Turfgrass in Hawaii and its Enemies

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On 29 August 1967 Clarence Lyman, Specialist in Pasture Management at the University of Hawaii, reported that strange caterpillars were active in pasture grasses at the Kualoa Ranch, Kaaawa, Oahu. The caterpillars were feeding on and causing some grass damage.

The species was not represented in the H.S.P.A., Bishop Museum* or State Department of Agriculture collections; and specimens were immediately sent to a Washington specialist for identification. These were identified by Dr. R. W. Hodges as *Herpetogramma licarsisalis*, a pyraustid, an economically important family of Lepidoptera.

Distribution

Swezey, 1946 reported that *Herpetogramma* (= *Pachyzancla*) *licarsisalis* was widely distributed from India, Ceylon, Malacca, China, Japan, Java, Borneo, Marshall Islands, Fiji, Samoa, Society Islands, Austral Islands, Australia; and that it was common on Guam.

With the discovery of the grass webworn at Kualoa, surveys disclosed that it was very abundant at Hickam with numerous moths resting on buildings during daytime and considerable larval activity in residential lawns. In rapid order, moths were found at Pupukea, Tantalus, Aiea, Manoa and numerous other parts of the city; and extensive turfgrass damage was observed at Kualoa and Aiea in October, Pali Golf Course in October and November, and numerous residential lawns throughout the city between November 1967 and April 1968.

On 5 and 6 February 1968, the first webworm larvae were collected in tifdwarf grass at Wailua House Lots, Kauai and within several months had spread to all parts of the island. This was the first record of *Herpetogramma* on Kauai. On 6 March 1968, grass webworms were discovered for the first time at Kipahulu Ranch, Maui where they were causing moderate to heavy damage to kikuyu and Bermuda grass. This was follow-

*Subsequent perusal of literature indicated that one specimen was in Bishop Museum collection.

ed light trap specimens found in Hilo, Hawaii on 11 March 1968; and on Molokai, 15 March adults were collected at Kaunakakai. They were very numerous in nut grass and Bermuda grass adjacent to the Hawaiian Sugar Planters' Association quarantine house at Mapulehu. *H. licarsisalis* has not been officially reported on Lanai but is undoubtedly present on that island.

Thus within seven months *Herpetogramma* was able to bridge our inter-island oceanic barriers and become well established on all islands.

Turfgrasses Attacked

Of the various grasses attacked by the webworm, kikuyu, *Pennisetum clandestinum*, an important forage crop is unquestionably highly preferred on all islands. On Oahu several acres of this grass on Kualoa Ranch were heavily infested in October 1967, with larval counts as high as 70 per square foot; at Kipapa, a heavy infestation occurred on Koa Ridge but no larval counts were available.

In March 1968 approximately 600 acres of kikuyu were infested at Kipahulu Ranch, Maui; and, more recently, pastures at Ulupalakua, and Honomalino, Hawaii have come under heavy attack, particularly at ele-

TABLE 1. *Host range of Herpetogramma licarsisalis.*

	Oahu	*Kauai*	*Molokai*	*Maui*	*Hawaii*
Axonopus affnis (Carpet grass)	×				(×)
Brachiaria mutica (California or Para grass)	×	×		×	
Chloris divaricata (Star grass)		×			
Cynodon dactylon (Bermuda grass—all varieties)	×	×	×	×	×
Digitaria adscendens (Henrys crabgrass)	×	×	×	×	
Digitaria decumbens (Pangola grass)	×	×	×	×	×
Eleusine indica (Wire grass)	×				×
Eremochloa ophiuroides (Centipede grass)					×
Panicum repens (Wainaku or Torpedo grass)					×
Paspalum conjugatum (Hilo grass)	×	×	×	×	×
Paspalum fimbriatum (Panama paspalum grass)	×				
Pennisetum clandestinum (Kikuyu grass)	(×)	(×)	(×)	(×)	(×)
Sporobolus africanus (Rattail grass)				×	
Stenotaphrum secundatum (Buffalo or St. Augustine grass)	×				

(×) Heavy infestation reported.

vations up to 1212 m.

At Kipu Ranch, Kauai 400 acres were heavily infested in April 1968 with webworm counts of 50 per square foot. In the following month the count dropped to three per square foot. In May 1968 Puu-O-Hoku Ranch, Molokai hosted *Herpetogramma* and 400 acres were heavily infested, with larval counts as high as 55 per square foot.

The host range of *Herpetogramma* is shown in the following table:

Description and Life History

Moth: (Fig. 1) Moths of *Herpetogramma* are gregarious in nature often clustered on vegetation and buildings, sometimes entering as uninvited guests. During heavy outbreaks, hundreds of fluttering moths will be exposed in grassy areas by the headlights of an approaching vehicle.

The moth has a wing spread of about 3/4 of an inch when at normal rest in the field and the body is about 1/2 inch long. It is a fairly uniform light brown in color with some small black dots scattered about the wings. When at rest it is triangular in shape. Moths will live from 6–8 days in capitivity and have a preoviposition period of 2–3 days. About 15 to 20 eggs are laid per day.

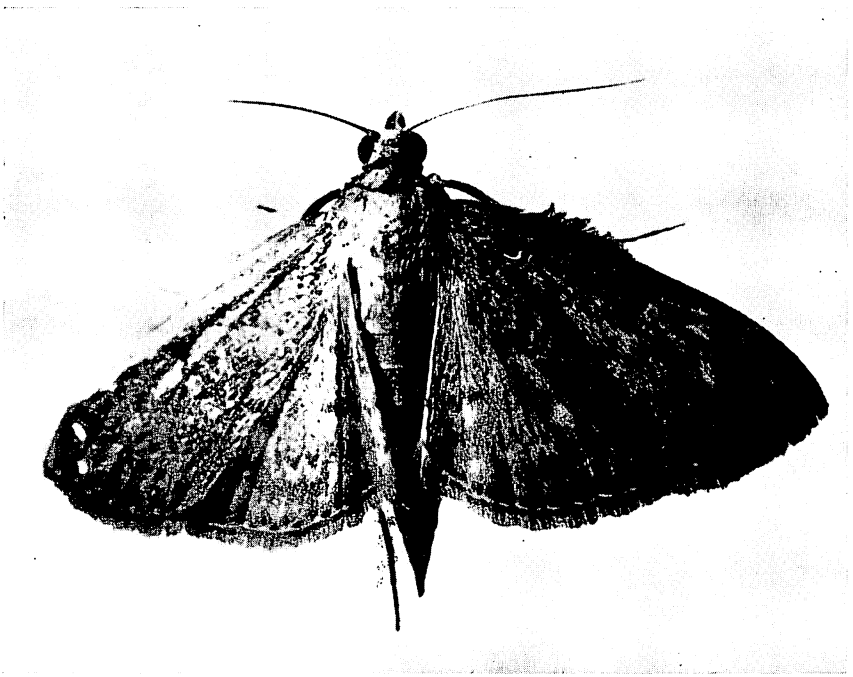

FIG. 1. *Adult Herpetogramma licarsisalis* (Photo courtesy of Dr. A. A. LaPlante, Univ. of Hawaii).

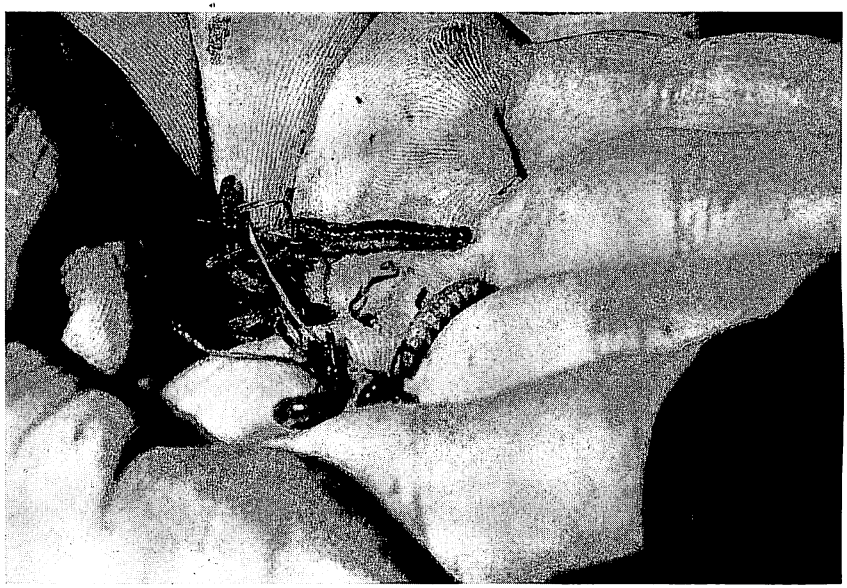

FIG. 2. Grass webworm larvae.

Egg: The egg is flat and whitish and often laid singly on the midribs of grass blades, usually on the top side and close to ground level. Hatching takes place in 4–5 days.

Caterpillar: (Fig. 2) The caterpillar apparently feed at night and during the day can be found near the base of grass in a curled position. When disturbed they become active and move around rapidly. They are usually shiny green in color when feeding and brown when unfed. The head is brown and light brown plates can be seen on the body. Stiff hairs are also present. When full grown the caterpillar measures about an inch long. The larval period is 11–12 days.

Pupa: The pupa is light brown to dark brown, about 1/2 inch long and lasts about 6 days. Prior to pupation the caterpillar makes a rough casing of debris within which to pupate.

Life cycle: One generation usually requires 28 to 32 days.

Control

Unlike some immigrant pests which have not been vulnerable to locally established entomophagus insects, the grass webworm is proving very susceptible to a number of parasites, some of which were purposely introduced for other lepidopterous pests and some such as *Trichogramma semifumatum* Perkins which arrived accidentally.

Egg Parasites: Foremost of the grass webworm enemies is the tiny wasp, *Trichogramma semifumatum* which parasitizes up to 96% of the eggs

of *Herpetogramma* from sea level to 610 m elevation. *Trichogramma* has been found in webworm eggs up to 1215 m but the specific identity of this species at higher elevations is pending determination.

Trichogramma was accidentally introduced into the state and has been recorded on practically all of our islands. Its hosts include the eggs of sphinx, *Cactoblastis* and other moths. An average of two wasps per egg is obtained from grass webworm and an average of four per egg from the other lepidoptera. The complete life cycle for *Trichogramma* is 8 days compared to 28–32 for *Herpetogramma*.

In initial webworm infestations in new localities, the incidence of egg parasitism is usually 0 to 30%, but by the time first generation moths appear, parasitism has increased to 96%. Parasitized eggs are black in color.

The effectiveness of *Trichogramma* at various elevations on Hawaii is shown in the following table:

TABLE 2. *Rate of parasitism of Herpetogramma eggs by Trichogramma.*

Webworm Host	*Locality*	*Elev. (meters)*	*Total Eggs Recovered*	*Total Eggs Parasitized*	*Percent Parasitism*
Hilo Grass	Insectary	13	48	46	96%
Centipede Grass	Homestead area	76	50	47	94%
Hilo Grass	Kaumana	152	41	38	93%
Hilo Grass	H.S.P.A.	91	74	70	95%
Hilo Grass	Kinoole St.	30	51	46	90%
Hilo Grass	Piihonua	258	86	78	91%
Kikuyu Grass	Honomalino	609	22	18	82%
Carpet Grass	Manuka Park	532	21	20	96%
Hilo Grass	Bayfront	0.7	24	21	88%

Other parasites which are exerting strong pressure on grass webworm populations include the following:

TABLE 3. *Parasites of Herpetogromma and their distribution in the Hawaiian Islands.*

	Oahu	*Kauai*	*Maui*	*Hawaii*
Larval parasites:				
Casinaria infesta (Cress.) (Hym: Ichneumonidae)	×	×	×	×
Cremastus (= *trathala*) *flavo-orbitalis* (Cam.) (Hym: Ichneumonidae)	×			×
Meteorus laphygmae Viereck (Hym: Braconidae)	×			
Eucelatoria armigera (Coq.) (Dip: Tachinidae)	×	×	×	×
Pupal parasites:				
Brachymeria sp. (Hym: Chalcidae)	×	×	×	×

There is evidence to indicate that *Trichogramma* is quite effective on all islands. However, since the webworm did not reach the neighbor islands until March 1968, assessment of larval and pupal parasitism is incomplete at this writing. On the basis of information available the ichneumonid, *C. flavo-ovbitalis*, appears to be very effective in a wide range of conditions as suggested by the large numbers of adults observed in infested areas and parasitism.

Other enemies of *Herpetogramma* include the predaceous ant, *Pheidole megacephala* (Fab.), which destroys the eggs, and cattle egrets which were observed foraging in infested grass at Koa Ridge Ranch, Kipapa, Oahu.

The outlook for effective control of the grass webworm in most localities throughout the State can be viewed with optimism. However, there may be a need to introduce more larval and pupal parasites.

ACKNOWLEDGEMENT

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